What is claimed is:

1. In a thermal energy transfer system comprising a heat transfer member having separate first and second surfaces each subjected to separate first and second temperatures, at least one of the first and second surfaces also being configured to be subjected to a fluid so that a liquid phase of the fluid is present on the at least one of said first and second surfaces, the improvement wherein:

said first surface comprising multiple and separate first surface alterations extending coextensively with an axial length of said heat transfer member and at least partially around the circumference thereof;

separate multiple electrical conductors each being received on a respective one of said separate first surface alterations;

an electric multi-phase alternating power source having multiple terminals and producing a number of phases corresponding to a number of said multiple terminals, each of said multiple electrical conductors being connected to a different one of said multiple terminals so that an electric traveling wave moves in a longitudinal direction of said heat transfer member so as to induce pumping of the liquid phase in the longitudinal direction to hereby enhance the thermal energy transfer characteristics of said thermal energy transfer system.

2. The thermal energy transfer system according to Claim 1, wherein each said first surface alteration is a recess in the heat transfer member, each said separate electrical conductor being received in a respective one of said recesses.

3. The thermal energy transfer system according to Claim 2, wherein said electrical conductors each have an outer surface oriented at least one of flush with and entirely beneath said first surface so that liquid will be able to flow in said direction on said first surface unobstructed by said electrical conductors.

4. The thermal energy transfer system according to Claim 3, wherein said direction is perpendicular to a longitudinal axis of said electrical conductors.

5. The thermal energy transfer system according to Claim 1, wherein said direction is perpendicular to a longitudinal axis of said electrical conductors.

F10

6. The thermal energy transfer system according to Claim 1, wherein said first surface includes heat transfer enhancing second surface alterations thereon, said multiple and separate first surface alterations being separate recesses in said second surface alterations, each said separate electrical conductor being received in a respective one of said recesses.

7. The thermal energy transfer system according to Claim 6, wherein said electrical conductors each have an outer surface oriented at least one of flush with and entirely beneath said first surface so that liquid will be able to flow in said direction on said first surface unobstructed by said electrical conductors.

8. The thermal energy transfer system according to Claim 7, wherein said direction is perpendicular to a longitudinal axis of said electrical conductors.

9. The thermal energy transfer system according to Claim 6, wherein said direction is perpendicular to a longitudinal axis of said electrical conductors.

10. The thermal energy transfer system according to Claim 1, wherein each said first surface alteration is a recess in the heat transfer member, each said separate electrical conductor being received in a respective one of said recesses, and wherein said electrical conductors each have an outer surface configured to conform to a shape of a respective said recess.

11. The thermal energy transfer system according to Claim 1, wherein said first surface alterations are spirally wound about the heat transfer member.

12. The thermal energy transfer system according to Claim 1, wherein each said first surface alteration includes a thin and flat electrically insulative layer fixedly applied to said first surface and wherein each said electrical conductor is a thin and flat electrical conductor fixedly applied to said insulative layer to electrically insulate the electrical conductor from said heat transfer member, the thin and flat contour of each said first surface alteration and each said electrical conductor facilitating a liquid movement in said direction on said first surface unobstructed by said first surface alterations and said electrical conductors.

13. The thermal energy transfer system according to Claim 1, wherein each said first surface alteration is a recess in the heat transfer member, each said separate electrical conductor being received in a respective one of said recesses, wherein each said first surface alteration additionally includes a thin and flat electrically insulative layer fixedly applied to a bottom wall of each respective said recess and wherein each said electrical conductor is a thin and flat electrical conductor fixedly applied to each said insulative layer to electrically insulate each said electrical conductor from said heat transfer member.

14. The thermal energy transfer system according to Claim 13, wherein said electrical conductors each have an outer surface oriented at least one of flush with and entirely beneath said first surface so that liquid will be able to flow in said direction on said first surface unobstructed by said electrical conductors.

15. The thermal energy transfer system according to Claim 1, wherein each said first surface alteration includes a longitudinally extending first segment and multiple ring-like second segments disposed in a spaced apart relation to each other and in parallel planes oriented transverse to a longitudinal axis of the heat transfer member, the second segments of each said first surface alteration being sequentially alternatingly oriented with respect to each other on said heat transfer member and intersecting said first segment.

16. The thermal energy transfer system according to Claim 1, wherein said first surface alterations are spirally wound in plural groups, a first group being spirally wound in a first longitudinal direction of said heat transfer member, a second group being oriented a longitudinal distance from said first group and being spirally wound in a second direction of said heat transfer member.

17. The thermal energy transfer system according to Claim 16, wherein said first and second directions are the same.

18. The thermal energy transfer system according to Claim 17, wherein said first surface alterations include a third group intermediate said first and second groups, said third group being spirally wound in the same direction as is said first and second groups.

19. The thermal energy transfer system according to Claim 18, wherein a longitudinal spacing between each first surface alteration in said first and second groups is uniform and the same whereas the longitudinal spacing between each said first surface alteration in said third group is uniform and closer together than the spacings in said first and second groups.

20. The thermal energy transfer system according to Claim 19, wherein mutually adjacent ones of said first, second and third groups are separated from one another by a ring mounted on said first surface and oriented in a plane transverse of a longitudinal axis of said heat transfer member to obstruct the longitudinal flow of said liquid.

21. The thermal energy transfer system according to Claim 16, wherein said first surface alterations include multiple axially extending segments oriented between said first and second groups and intersecting the first surface alterations in said first and second groups.

22. The thermal energy transfer system according to Claim 16, wherein said first and second directions are opposite to each other.

23. The thermal energy transfer system according to Claim 1, wherein said first surface alterations are spirally wound in plural groups, a first group being spirally wound in a first direction along a segment of length of said heat transfer member, a mutually adjacent second group being spirally wound in a second direction

along a further segment of length of said heat transfer member opposite said first direction so that each group will produce an electric traveling wave moving in a direction opposite to the direction of an electric traveling wave of a mutually adjacent group so as to induce pumping of said thin liquid layer in each group at least one of away from each other and toward each other.

24. In a thermal energy transfer system comprising plural heat transfer members each having separate first and second surfaces each subjected to separate first and second temperatures, at least one of the first and second surfaces also being configured to be subjected to a fluid so that a liquid phase of the fluid is present on the at least one of said first and second surfaces and an outer conduit in which is oriented the plural heat transfer members, the improvement wherein:

said first surface comprising multiple and separate first surface alterations extending coextensively with an axial length of said heat transfer member and at least partially around the circumference thereof;

separate multiple electrical conductors each being received on a respective one of said separate first surface alterations;

an electric multi-phase alternating power source having multiple terminals and producing a number of phases corresponding to a number of said multiple terminals, each of said multiple electrical conductors being connected to a different one of said multiple terminals so that an electric traveling wave moves in a longitudinal direction of said heat transfer member so as to induce pumping of the liquid phase in the longitudinal

direction to hereby enhance the thermal energy transfer characteristics of said thermal energy transfer system.

25. The thermal energy transfer system according to Claim 24, wherein each said first surface alteration is a recess in the heat transfer member, each said separate electrical conductor being received in a respective one of said recesses.

26. The thermal energy transfer system according to Claim 25, wherein said electrical conductors each have an outer surface oriented at least one of flush with and entirely beneath said first surface so that liquid will be able to flow in said direction on said first surface unobstructed by said electrical conductors.

27. The thermal energy transfer system according to Claim 26, wherein said direction is perpendicular to a longitudinal axis of said electrical conductors.

28. The thermal energy transfer system according to Claim 24, wherein said direction is perpendicular to a longitudinal axis of said electrical conductors.

29. The thermal energy transfer system according to Claim 24, wherein said first surface includes heat transfer enhancing second surface alterations thereon, said multiple and separate first surface alterations being separate recesses in said second surface alterations, each said separate electrical conductor being received in a respective one of said recesses.

30. The thermal energy transfer system according to Claim 29, wherein said electrical conductors each have an outer surface oriented at least one of flush with and entirely beneath said first surface so that liquid will be able to flow in said direction on said first surface unobstructed by said electrical conductors.

31. The thermal energy transfer system according to Claim 30, wherein said direction is perpendicular to a longitudinal axis of said electrical conductors.

32. The thermal energy transfer system according to Claim 29, wherein said direction is perpendicular to a longitudinal axis of said electrical conductors.

33. The thermal energy transfer system according to Claim 24, wherein each said first surface alteration is a recess in the heat transfer member, each said separate electrical conductor being received in a respective one of said recesses, and wherein said electrical conductors each have an outer surface configured to conform to a shape of a respective said recess.

34. The thermal energy transfer system according to Claim 24, wherein said first surface alterations are spirally wound about the heat transfer member.

35. The thermal energy transfer system according to Claim 24, wherein each said first surface alteration includes a thin and flat electrically insulative layer fixedly applied to said first surface and wherein each said electrical conductor is a thin and flat electrical conductor fixedly applied to said insulative layer to electrically insulate the electrical conductor from said heat transfer member, the thin and flat contour of each said first surface alteration and each said electrical conductor facilitating a liquid movement in said direction on said first surface unobstructed by said first surface alterations and said electrical conductors.

36. The thermal energy transfer system according to Claim 24, wherein each said first surface alteration is a recess in the heat transfer member, each said separate electrical conductor being received in a respective one of said recesses, wherein each said first surface alteration additionally includes a thin and flat electrically insulative layer fixedly applied to a bottom wall of each respective said recess and wherein each said electrical conductor is a thin and flat electrical conductor fixedly applied to each said insulative layer to electrically insulate each said electrical conductor from said heat transfer member.

37. The thermal energy transfer system according to Claim 36, wherein said electrical conductors each have an outer surface oriented at least one of flush with and entirely beneath said first surface so that liquid will be able to flow in said direction on said first surface unobstructed by said electrical conductors.

38. The thermal energy transfer system according to Claim 24, wherein each said first surface alteration includes a longitudinally extending first segment and multiple ring-like second segments disposed in a spaced apart relation to each other and in parallel planes oriented transverse to a longitudinal axis of the heat transfer member, the second segments of each said first surface alteration being sequentially alternatingly oriented with respect to each other on said heat transfer member and intersecting said first segment.

39. The thermal energy transfer system according to Claim 24, wherein said first surface alterations are spirally wound in plural groups, a first group being spirally wound in a first longitudinal direction of said heat transfer member, a second group being oriented a longitudinal distance from said first group and being spirally wound in a second direction of said heat transfer member.

40. The thermal energy transfer system according to Claim 39, wherein said first and second directions are the same.

41. The thermal energy transfer system according to Claim 40, wherein said first surface alterations include a third group intermediate said first and second groups, said third group being spirally wound in the same direction as is said first and second groups.

42. The thermal energy transfer system according to Claim 41, wherein a longitudinal spacing between each first surface alteration in said first and second groups is uniform and the same whereas the longitudinal spacing between each said first surface alteration in said third group is uniform and closer together than the spacings in said first and second groups.

43. The thermal energy transfer system according to Claim 42, wherein mutually adjacent ones of said first, second and third groups are separated from one another by a ring mounted on said first surface and oriented in a plane transverse of a longitudinal axis of said heat transfer member to obstruct the longitudinal flow of said liquid.

44. The thermal energy transfer system according to Claim 37, wherein said first surface alterations include multiple axially extending segments oriented between said first and second groups and intersecting the first surface alterations in said first and second groups.

45. The thermal energy transfer system according to Claim 39, wherein said first and second directions are opposite to each other.

46. The thermal energy transfer system according to Claim 24, wherein said first surface alterations are spirally wound in plural groups, a first group being spirally wound in a first direction along a segment of length of said heat transfer member, a mutually adjacent second group being spirally wound in a second direction

along a further segment of length of said heat transfer member opposite said first direction so that each group will produce an electric traveling wave moving in a direction opposite to the direction of an electric traveling wave of a mutually adjacent group so as to induce pumping of said thin liquid layer in each group at least one of away from each other and toward each other.

47. In a thermal energy transfer system comprising a heat transfer member having separate first and second surfaces each subjected to separate first and second temperatures, at least one of the first and second surfaces also being configured to be subjected to a fluid so that a liquid phase of the fluid is present on the at least one of said first and second surfaces, the improvement wherein:

said first surface comprising multiple and separate first surface alterations extending coextensively with an axial length of said heat transfer member;

separate multiple electrical conductors each being received on a respective one of said separate first surface alterations;

an electric multi-phase alternating power source having multiple terminals and producing a number of phases corresponding to a number of said multiple terminals, each of said multiple electrical conductors being connected to a different one of said multiple terminals so that an electric traveling wave moves in a direction perpendicular to a longitudinal axis of each said electrical conductor so as to induce pumping of the liquid phase in the direction to hereby enhance the

thermal energy transfer characteristics of said thermal energy transfer system.

48. In a thermal energy transfer system comprising at least one heat transfer member having separate first and second surfaces each subjected to separate first and second temperatures, at least one of the first and second surfaces also being configured to be subjected to a fluid so that a liquid phase of the fluid is present on the at least one of said first and second surfaces and an outer conduit in which is oriented the plural heat transfer members, the improvement wherein:

said first surface comprising multiple and separate first surface alterations extending coextensively with an axial length of said at least one heat transfer member;

separate multiple electrical conductors each being received on a respective one of said separate first surface alterations;

an electric multi-phase alternating power source having multiple terminals and producing a number of phases corresponding to a number of said multiple terminals, each of said multiple electrical conductors being connected to a different one of said multiple terminals so that an electric traveling wave moves in a direction perpendicular to a longitudinal axis of each said electric conductor so as to induce pumping of the liquid phase in the longitudinal direction to hereby enhance the thermal energy transfer characteristics of said thermal energy transfer system.

49. The thermal energy transfer system according to Claim 48, wherein said outer conduit includes at least one non-heat transfer element on which is provided additional electrical conductors for facilitating additional liquid position management inside said outer conduit.